

REMARKS

In the aforementioned Office Action, the Examiner has rejected Claims 53-81 as being unpatentable over each of United States Patents 4,933,106 to Sakai et al., 4,940,517 to Wei, 5,068,060 to Jen et al. or 4,771,111 to Tieke et al. In the Office Action the Examiner has stated:

“The present claims are drawn to an electrically conductive composition containing an electrically conductive polymer and a polymer dopant, the method of making such a composition and articles formed therefrom. The electrically conductive polymer and the polymer dopant can be selected from lists of well known conductive polymers and well known polymer dopants. Each of the references listed above teach (sic) an electrically conductive composition containing an electrically conductive polymer and a polymer dopant as taught by applicant. Each reference teaches at least one embodiment of applicant's invention. While some of applicant's dependent claims recite a specific conductive polymer with a specific dopant, nothing unobvious is seen in merely selecting a conductive polymer and a polymer dopant from the lists of materials that are taught by the prior art.

Sakai discloses an electrically conductive composition, and method of making such, comprising a conductive polymer and a polymer dopant, which can be the same as those presently claimed. See columns 2 and 3. For example Sakai teaches polypyrrole and polythiophene as polymers and teaches polyacrylic acid, polysulfonic acids and acids containing carboxylic groups as dopants. It would have been prima facie obvious for one skilled in the art to make an electrically conductive composition out of any combination of these polymers and dopants as Sakai clearly suggests that such may be done.

Wei discloses an electrically conductive composition, and method of making such, comprising polyaniline and a polymer dopant. The dopant can be polysulfonic acid or polyacrylic acid. See column 4, lines 4-8.

Jen discloses an electrically conductive composition, and a method of making such, comprising a polymer (heterocyclic vinylene) and a polymer dopant. The dopant can be by polyacrylic acid and those containing carboxylic acid or sulfonic acid groups. See abstract and column 14, lines 57-65.

Tieke discloses an electrically conductive composition comprising a mixture of polyimide and polypyrrole. See abstract examples.

While all of the references do not contain a specific example teaching an electrically conductive polymer and a polymer dopant, the suggestion to do

so is clearly suggested in each patent. The skilled artisan would simply expect that the polymer dopants would produce results similar in degree to the other dopants listed and specifically demonstrated. Nothing unobvious is seen in doing so. Additionally, note that each reference teaches the shaping of the polymer material into useful articles."

The Examiner has also cited an article by Li which he concedes does not exemplify the composition as claimed by applicants.

In response to the rejection of Claims 53-81 with respect to the above-cited references, applicants have amended claim 53 to recite that the composition is a reaction product formed from a Lewis base electrically conductive polymer in an organic solvent in undoped form and a Lewis acid polymer dopant in said organic solvent, with the result that the resulting conductive blend is soluble in said organic solvent and miscible at the molecular level. The aforementioned cited references do not disclose a soluble composition of matter. These patents specifically state that the appropriate monomer, whether aniline, pyrrole or thiophene are polymerized in the presence of a polyacid. As the polymerization of the monomer proceeds, the polymer doped with the polymeric acid precipitates from the reaction solution.

It is well known in the art that polythiophene and polypyrrole are not soluble polymers. Thus it is clear that it is not possible to have solutions of the preformed polymer as is the case in the present invention.

In reviewing the references cited, none discloses *a reaction product of two soluble polymers* resulting in a conducting, miscible, soluble blend. (Emphasis added.)

If the doped polymers of the present invention were to be synthesized by the methods disclosed in United States Patents 4,933,106 to Sakai et al., 4,940,517 to Wei, 5,068,060 to Jen et al. or 4,771,111 to Tieke et al., (which are basically *in-situ* polymerizations of the monomer in the polyacid), the conducting polymer blend precipitates out of solution as a powder. The summary of the teachings of the various references cited above set forth in the amendment filed September 7, 1993 is hereby incorporated by reference herein.

In the present invention, the two polymers are reacted in solution via an acid base reaction and the reaction product remains soluble in organic solvent and the two polymers are miscible. The benefit accruing from this phenomenon is that the resulting blend can be further processed by solution casting techniques. As a result of the solubility of the resulting blend and chemical interaction between the two polymers, gels can be formed. The prior art does not

disclose this. Further, no phase separation occurs and the polymers do not precipitate out of solution.

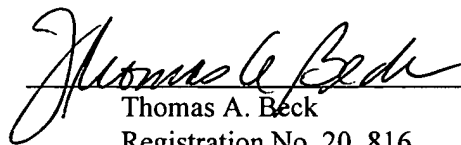
Another distinction between the present invention and the prior art is the fact that the blend is miscible at the molecular level. It is well known in the polymer art that thermodynamically, polymer pairs are not miscible on the molecular level. Also the compatibility of polymer pairs varies to a great extent. The dispersed phase in a polymer blend without a compatibilizer present therein tends for the most part to coalesce during the post compounding step. This is a significant problem when dealing with polymer blends. The prior art teaches that compatibilizers must be used to obtain miscibility of the polymers in the blend. The present invention requires no compatibilizer to obtain a miscible blend of polymers.

Applicants have declared in the declaration submitted with the prior amendment that they have determined that with respect to the present invention, at no time does the conducting polymer blend precipitate from solution. That is, the precursor polymer (the conducting polymer in undoped form) and the polyacid are both soluble in a given solvent. The reaction of the two is carried out in solution, and the product, which is the conducting polymer remains soluble in the given solvent. This result is clearly different from and unobvious in view of the prior art.

As a result of the amendment to claim 53 and the arguments presented herein, allowance of claims 53-81 is respectfully requested.

Respectfully Submitted,

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MAILING CERTIFICATE

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I hereby certify that this amendment with fee
is being deposited with the United States
Postal Service under 37 CFR §1.10 on the date
indicated above and is addressed to the
Commissioner of Patents and Trademarks,
Washington, D.C. 20231

Thomas A. Beck
Sender



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